INVENTIONS & INNOVATION

Success Story

PowerRim™ High-Wattage Energy-Saving Compact Fluorescent Light (CFL) Adaptor for Recessed Downlights

Easily Installed Adaptor Kit Allows CFL to Screw into Incandescent Socket of Downlight Reducing Energy and Costs

Benefits

- Allows use of higher-wattage CFLs that are 4 times more energy-efficient than incandescent lamps and last 10 times longer
- is saving 13 billion Btu annually
- Has avoided $17 million in energy purchases and 820 tons of CO_2 emissions from electricity generation through 2000

Applications

Allows malls, restaurants, hotels, and motels to use CFLs for high-wattage (100 W and higher) recessed downlights in commercial settings.

"The Inventions and Innovation grant allowed Powerlux® Corporation to fabricate and test the first PowerRim™ adaptors."

– Kenneth H. Lau
President
PowerLux® Corporation

Commercial properties wanting to save energy require high-wattage, high-quality lighting for safe visual conditions and optimum product display. Many commercial properties are excellent sites for CFLs; however, these settings typically use recessed downlights with incandescent and halogen lamps because standard CFLs, with their attached ballasts, cannot fit in the limited space of recessed cans. The upside-down design of the reflector cone hinders the transfer of heat generated by the lamp. For every 10°C above the desired operating temperature, the ballast life is reduced by 50%. Unfortunately, use of CFLs above 18 W result in excessive operating temperatures, reduced light output, and destruction of the ballast. Low wattage is both ineffective and unsafe for most commercial lighting applications.

PowerRim™ is an innovative, effective adaptor to convert recessed downlights to higher-wattage CFLs. PowerRIM™ locates the ballast in a cool zone, providing high-quality light and eliminating early failures. The viability of the PowerRim™ high-wattage CFL adaptor for recessed downlights has been demonstrated by inventor, Ken Lau, of PowerLux® Corporation with assistance from the U.S. Department of Energy's Inventions and Innovation Program. The system has endured stringent performance tests by GE Lighting (40,000 cycles of 3 hours on and 20 minutes off) without deterioration of the cathodes. The PowerRIM™ has passed UL and FCC approvals for both the commercial and residential classes of use and extends the life of the ballast while giving maximum light output, further improving the technology's economics.

Technology Description

As the schematic shows, the PowerRim™ adaptor includes an adaptor assembly, which screws directly into the vacated incandescent socket; a CFL socket, which receives the CFL tube; the CFL tube itself; a reflector cone; and a

PowerRim Installation

ring-shaped glare shield baffle, which houses the ballast and is mounted at the ceiling surface. Placing the ballast in the glare shield below the lamp substantially reduces the temperature and boosts light output.

Technology Applications

Assuming 600 kWh per year are saved per unit, over 6000 PowerRim™ units are saving 3.6 million kWh or 13 billion Btu per year in a variety of installations. Studies show over 200 million units of recessed downlights could be retrofitted with PowerRim™. If only 5% of these were converted, 6 billion kWh could be saved each year. PowerRim™ 42-W CFL adapters (equivalent to 200-W incandescent lamps) were selected by Carlsbad Seapointe Resort (Carlsbad, California) for the clubhouse, kitchens, and food preparation areas. The resort reports that energy consumption was reduced by 64% with a much higher lighting level compared with previous halogen lights.

PowerRim™ 18-W CFL adaptors (equivalent to 75-W incandescent bulbs) were installed at the University of California Medical School (San Diego) in elevator lobbies and public areas. Staff had previously tried many different types of disposable CFLs to replace incandescent lamps in the recessed downlights without success. These CFLs provided too little light, and the lamps did not last 10,000 hours as advertised. After installing PowerRim™ CFL adaptors, the lights were so bright that staff capped off every other lighting fixture. The result is an 88% reduction in energy consumption with improved, evenly diffused lighting.

The Coronado Springs Resort & Convention Center at Walt Disney World (Orlando, Florida) installed PowerRim™ 26-W CFL adaptors (equivalent to 100-W incandescent bulbs) inside 2000 guest bathrooms. The resort had tried CFLs with new fixtures, but the light output was weak and did not penetrate to the shower stall areas of the bathrooms. PowerRim™ reduced energy consumption by 74% from previous incandescent lighting. The bathrooms are bright and the light penetrates behind the shower curtain. Concerns about the hotel's liability from potential slips and falls due to poor lighting are resolved.

As technologically advanced as the PowerRim™ high-wattage CFL adaptor is, its real selling point is sustainable energy savings. Replacing a single 100-W incandescent fixture with a 26-W CFL saves 600 kWh per year. PowerRim™ also is easily installed, eliminating the costly expense of removing existing fixtures by an electrician. CFLs last more than 10 times longer than incandescent lamps and replacement occurs much less frequently.

Inventions and Innovation Program

The Inventions and Innovation Program provides financial assistance for establishing technical performance and conducting early development of innovative ideas and inventions. Ideas that have a significant energy-savings impact and future commercial market potential are chosen for financial support through a competitive solicitation process. Inventions funded by the program have saved enough energy to light 10 million homes per year. In addition, the program offers technical guidance and commercialization support to successful applicants. Ideas that benefit the Industries of the Future, designated by the Office of Industrial Technologies as the most energy-intensive industries in the United States, are especially encouraged.

For project information, contact:

Kenneth H. Lau
President
PowerLux® Corporation
1260 Liberty Way
Suite E
Vista, CA 92083
Phone: (760) 727-2360
Fax: (760) 434-4766
klpowerlux@aol.com

Visit our home page at
www.powerlux.com

For more information about the Inventions and Innovation Program, contact:

Lisa Barnett
Program Manager
Inventions and Innovation Program
U.S. Department of Energy
1000 Independence Avenue SW
Washington, D.C. 20585-0121
Phone: (202) 586-2212
Fax: (202) 586-7114
lisa.barnett@ee.doe.gov

Visit our home page at
www.oit.doe.gov

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